



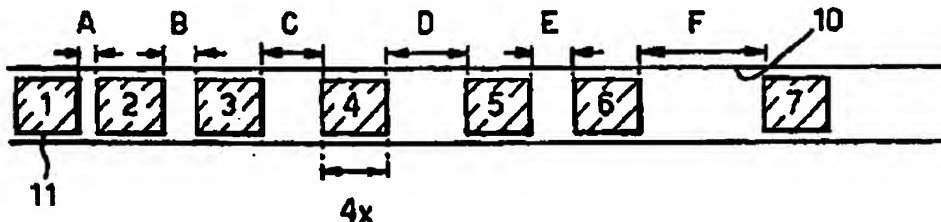
PCT

WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁷ : G08B 13/24, B65D 75/66, G01V 15/00		A1	(11) International Publication Number: WO 00/05694
			(43) International Publication Date: 3 February 2000 (03.02.00)
(21) International Application Number: PCT/GB99/02372 (22) International Filing Date: 21 July 1999 (21.07.99) (30) Priority Data: 9815917.1 21 July 1998 (21.07.98) GB (71) Applicant (for all designated States except US): FLYING NULL LIMITED (GB/GB); Harston Mill, Harston, Cambridgeshire CB2 5NH (GB). (72) Inventors; and (75) Inventors/Applicants (for US only): ARNOLD, David, Howard [GB/GB]; 20 Pine Grove, Weybridge, Surrey KT13 9AW (GB). CROSSFIELD, Michael, David [GB/GB]; Perne Drift, Burton End, West Wickham, Cambridge CB1 6SD (GB). (74) Agent: ABRAMS, Michael, John; Haseltine Lake & Co., Imperial House, 15-19 Kingsway, London WC2B 6UD (GB).		(81) Designated States: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG). Published With international search report.	

(54) Title: SECURITY PACKAGING



(57) Abstract

There is disclosed a means of verifying the authenticity of merchandise or uniquely identifying a particular batch or pack of merchandise by providing on or within the merchandise packaging a magnetically coded strip comprising high permeability, low coercivity material. The magnetically coded strip exhibits zero or very low remanence and consequently is not susceptible to permanent change in its magnetic properties by exposure to a strong magnetic field. In one particular embodiment, the magnetically coded strip is embedded within the tear-off strip which forms part of the outer wrapping of cigarette packaging.

FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AL	Albania	ES	Spain	LS	Lesotho	SI	Slovenia
AM	Armenia	FI	Finland	LT	Lithuania	SK	Slovakia
AT	Austria	FR	France	LU	Luxembourg	SN	Senegal
AU	Australia	GA	Gabon	LV	Latvia	SZ	Swaziland
AZ	Azerbaijan	GB	United Kingdom	MC	Monaco	TD	Chad
BA	Bosnia and Herzegovina	GE	Georgia	MD	Republic of Moldova	TG	Togo
BB	Barbados	GH	Ghana	MG	Madagascar	TJ	Tajikistan
BE	Belgium	GN	Guinea	MK	The former Yugoslav Republic of Macedonia	TM	Turkmenistan
BF	Burkina Faso	GR	Greece			TR	Turkey
BG	Bulgaria	HU	Hungary	ML	Mali	TT	Trinidad and Tobago
BJ	Benin	IE	Ireland	MN	Mongolia	UA	Ukraine
BR	Brazil	IL	Israel	MR	Mauritania	UG	Uganda
BY	Belarus	IS	Iceland	MW	Malawi	US	United States of America
CA	Canada	IT	Italy	MX	Mexico	UZ	Uzbekistan
CF	Central African Republic	JP	Japan	NE	Niger	VN	Viet Nam
CG	Congo	KE	Kenya	NL	Netherlands	YU	Yugoslavia
CH	Switzerland	KG	Kyrgyzstan	NO	Norway	ZW	Zimbabwe
CI	Côte d'Ivoire	KP	Democratic People's Republic of Korea	NZ	New Zealand		
CM	Cameroon			PL	Poland		
CN	China	KR	Republic of Korea	PT	Portugal		
CU	Cuba	KZ	Kazakhstan	RO	Romania		
CZ	Czech Republic	LC	Saint Lucia	RU	Russian Federation		
DE	Germany	LI	Liechtenstein	SD	Sudan		
DK	Denmark	LK	Sri Lanka	SE	Sweden		
EE	Estonia	LR	Liberia	SG	Singapore		

SECURITY PACKAGING

5 This invention relates to security packaging and, more particularly, is concerned with the application of magnetic techniques to improve levels of product security. The invention is particularly useful for use with cigarette packaging, but is not restricted to such usage.

10 Product counterfeiting has long been a problem for brand owners. Manufacturers are rightly concerned about the protection of their brand image and wish to control the distribution of their products and to monitor the levels of counterfeit product in the world marketplace.

20 European Patent Application (EP0317202A) discloses a novel tear strip or sealing strip for a package or container. The tear strip or sealing strip comprises a plastic film substrate upon which a magnetisable metal oxide coating has been deposited. The coated strip may be adhered to the package or the flexible wrapping material for the package or container. Optionally, the strip may be coated with a pigment or metallised or printed with graphic indicia or any combination of these features. Information may be recorded on the magnetic coating during packaging and handling for subsequent read-out.

30 This prior magnetic system has not had commercial success, primarily for two reasons:

35 Firstly, contact reading devices are required in order to read out any information on the magnetised metal oxide coating; n.b. - and secondly, any such recorded information can easily be erased by bringing the sealing strip or tear strip into a powerful AC

-2-

magnetic field.

The present invention aims to obviate or at least ameliorate these problems.

5

According to one aspect of the present invention there is provided a method of verifying the authenticity of merchandise or of uniquely identifying a particular batch or pack of merchandise, which
10 comprises incorporating in, or securing to, at least one component of the packaging in which the merchandise is packaged for distribution and/or sale, a magnetically coded strip having a predetermined pattern of high permeability, low coercivity magnetic elements
15 exhibiting zero or very low remanence.

The remanence of a material is a measure of the magnetic flux remaining in a ferromagnet when the saturating magnetic field is reduced to zero. It
20 therefore represents the ability of a material to become permanently magnetised. The magnetic material used in this aspect of the present invention is not magnetisable in the conventional sense, since it exhibits zero or very low remanence and consequently,
25 it is not susceptible to permanent change in its magnetic properties by exposure to a strong magnetic field (as is the case, for example, when magnetic recording tape or other materials containing a magnetisable metal oxide coating are used for security
30 applications).

According to a second aspect of the present invention there is provided a magnetically coded strip which provides means of verifying the authenticity of
35 merchandise, or of uniquely identifying a particular batch or pack of merchandise, characterised in that the

strip comprises a predetermined pattern of high permeability, low coercivity magnetic elements exhibiting zero or very low remanence, wherein said magnetically coded strip is incorporated in, or secured to, at least one component of merchandise packaging.

Suitable magnetic materials for use with the present invention include thin film materials such as ATALANTE from IST, and amorphous spin melt materials such as Vacuumschmeltze 6025 and 6006.

The high permeability, low coercivity magnetic material may be located on the surface of a component of the packaging material or it may be embedded within a relatively thin component (e.g. in the paper or plastics material from which a packaging carton is made). In the particular case of cigarette packaging, the magnetic material may be embedded within the tear-off strip which forms part of the foil wrapping material; alternatively, or in addition, a high permeability, low coercivity magnetic material may be coated on to part of the carton, for example between the inner frame and the outer.

According to a third aspect of the present invention there is provided a system for use in verifying the authenticity of merchandise, or for use in uniquely identifying a particular batch or pack of merchandise, comprising:

(i) a magnetically coded verification strip, provided on or within at least one component of the merchandise packaging, wherein said verification strip comprises high permeability, low coercivity magnetic material which exhibits zero, or very low, remanence; and

(ii) means for interrogating the verification

strip so as to read the information stored on or within said strip.

By virtue of the properties of the magnetic material, the existence of such a high permeability, low coercivity magnetic strip cannot easily be detected by optical means or by conventional magnetic readers. The preferred means for detecting and/or reading a coded magnetic strip in the method of this invention involves the technology described in our International Patent Publication No. WO 96/31790 which exploits the difference between the magnetic behaviour of a magnetically active element when subjected to (i) a region of zero magnetic field, known as a magnetic null, and (ii) a high, saturating magnetic field. The disclosure of WO 96/31790 is incorporated herein by reference thereto; for convenience the technology described therein will be referred to hereinafter as "FN technology".

Any convenient techniques for coding the soft magnetic material may be employed. It is preferred, however, to use techniques such as are described in our International Patent Publications Nos. WO 96/31790 and WO 97/04338. The disclosure of WO 97/04338 is incorporated herein by reference thereto.

One such method of storing information on a magnetic tag involves attaching to the tag a plurality of magnetically detectable elements, the geometrical arrangement of which provides a code relating to the information being stored. By employing FN technology to interrogate the tag, a relationship may exist between the geometrical arrangement of the magnetic strips and the detectable change in magnetic field pattern, arising due to fluctuations in the direction of

-5-

magnetic saturation of the strips, as the element is subjected to first a zero field and then a high, saturating field.

5 A further method of storing information involves the use of a tag formed from a continuous strip of high permeability material, discrete regions of which have their magnetic properties permanently or temporarily modified. In relatively simple embodiments, each
10 magnetically active region has the same magnetic characteristics; in more complex embodiments, each magnetically active region can possess a different magnetic characteristic.

15 Magnetic reading devices at least some of which will be of benefit in conjunction with the present invention are disclosed in, for example, our subsequent International Patent Publications Nos. WO 97/48990 and
20 WO 98/15851 the disclosure of each of which is incorporated herein by reference thereto. A number of possible embodiments are described in these applications employing either permanent magnets or electromagnets to create the required magnetic field configuration. One particular implementation works by
25 detecting the harmonics of a superimposed low-amplitude alternating interrogation field.

 Preferably, the high permeability, low coercivity magnetic material is applied to the surface of the
30 packaging components by hot-foil stamping, adhesion or lamination. In one embodiment, the magnetically coded strip is applied to the total length of the tear-off strip; the magnetic code can then appear repeatedly along the length of the strip. In another embodiment,
35 the high permeability, low coercivity magnetic material is located in a predetermined location along the length

-6-

of the tear-off strip, the arrangement being such that the coded information stored in the magnetic strip is located in a predetermined position with respect to the face of the carton. This arrangement requires proper registration between the carton and a magnetic read-out head when the magnetically coded information is to be retrieved.

According to a fourth aspect of the present invention, there is provided a magnetically coded strip which provides means of verifying the authenticity of merchandise or uniquely identifying a particular batch or pack of merchandise, characterised in that the strip comprises a layer of a first high permeability, low coercivity magnetic material, and a layer of a second magnetic material carrying, or capable of carrying, a recorded magnetic pattern, wherein said magnetically coded strip is incorporated in, or secured to, at least one component of merchandise packaging.

According to a fifth aspect of the present invention, there is provided a method of verifying the authenticity of merchandise or uniquely identifying a particular batch or pack of merchandise, which comprises incorporating in, or securing to, at least one component of the packaging in which the merchandise is packaged for distribution and/or sale, a magnetically coded strip comprising a layer of a first high permeability, low coercivity magnetic material, and a layer of a second magnetic material carrying, or capable of carrying, a recorded magnetic pattern.

As mentioned above, a magnetically coded strip may be mounted between the inner frame and the outer frame of the cigarette package either instead of or in addition to the use of a similar material on the

-7-

tear-off strip of the packaging. The magnetic codes used may be of the read-only or programmable type. Preferably, only part of the overall code is susceptible to programming; in this way, the read-only component of the code may for example be used to relate to the packaging machine in which the product is being packaged, while the programmable component may be used to relate to the batch number. With such a system, writing information in the programmable component of the magnetic strip could take place on-line during the packaging process.

Advantageously, there may also be provided a means for generating a visual and/or audible confirmation of a valid readout, in order to demonstrate the authenticity of the merchandise or uniquely identify a particular batch or pack. This may preferably be provided within the device responsible for generating the interrogating magnetic field.

The invention will now be described by way of example, with reference to the accompanying drawings, in which:

Figure 1 illustrates a package having a magnetically coded verification strip embedded into a tear-off strip;

Figure 2 illustrates an example of a magnetically coded strip; and

Figure 3 illustrates a second example of a magnetically coded strip.

Figure 1 shows a diagrammatic representation of a package 14, for example a pack of cigarettes, in which

-8-

a tear-off strip 12 carries a high permeability, low coercivity magnetic material (indicated at 13, although not visually discernible from the remainder of the strip 2) which has been encoded in the manner disclosed in WO 96/31790.

Figure 2 shows one example of a magnetically coded strip 10 in accordance with the present invention. The strip comprises seven square elements 11 of high permeability, low coercivity material which are all physically identical, both in terms of their magnetic properties and in terms of their size. The magnetic elements have been secured to a substrate strip in a predetermined manner, such that their geometrical arrangement provides a code relating to the information being stored. This arrangement may be repeated along the whole length of the tear-off packaging strip, or it may be positioned at a predetermined location along the tear-off strip. The magnetic elements 11 in this embodiment have a width of $4x$ and have been arranged such that the gaps between the elements vary between x and $8x$. Specifically, the size of the gaps in this example are easily represented in the following table in which reference letters A to F denote the gaps shown in Figure 2.

	A	B	C	D	E	F
Size	X	2x	4x	5x	3x	8x

The reader should appreciate however, that the specific relationship between the width of these elements and the gaps between them are given merely by way of example.

Figure 3 illustrates another example of a magnetically coded strip which may be used in the present invention. The strip 20 comprises two layers of

magnetic material in which the top layer 21 is a hard or semi-hard magnetic material and the bottom layer 22 is a high permeability, low coercivity material. The top layer 21, has been permanently magnetised so as to exhibit distinct regions (not shown) of varying magnetic property such that its local magnetic field pattern varies across its length. This provides a method of encoding the bottom layer 22, since it will experience varying levels of magnetic flux along its length due to the recorded magnetic patterns in the top layer 21. Since these recorded patterns may be erased and new patterns recorded on their place, this embodiment provides a programmable coded strip.

However, it should be appreciated that although this embodiment may be easily employed in the present invention, the preferred embodiment is one which utilises distinct elements of high permeability, low coercivity material, as illustrated by Figure 2.

-10-

CLAIMS

1. A method of verifying the authenticity of merchandise or of uniquely identifying a particular
5 batch or pack of merchandise, which comprises incorporating in, or securing to, at least one component of the packaging in which the merchandise is packaged for distribution and/or sale, a magnetically coded strip having a predetermined pattern of high
10 permeability, low coercivity magnetic elements exhibiting zero or very low remanence.
2. A method according to claim 1, wherein the said magnetically coded strip is embedded within a component
15 of the packaging.
3. A method according to claim 1, wherein the said magnetically coded strip is located on the surface of said packaging component.
20
4. A method according to claim 3, wherein the said magnetically coded strip is applied to the surface of the packaging component by means of hot-foil stamping.
- 25 5. A method according to claim 3, wherein the said magnetically coded strip is applied to the surface of the packaging component by means of adhesion.
6. A method according to claim 3, wherein the
30 magnetically coded strip is applied to the surface of the packaging component by means of lamination.
7. A system for use in verifying the authenticity of merchandise or for use in uniquely identifying a
35 particular batch or pack of merchandise, comprising:
 - (i) a magnetically coded verification strip,

-11-

provided on or within at least one component of the merchandise packaging, wherein said verification strip comprises high permeability, low coercivity magnetic material which exhibits zero, or very low, remanence;

5 and

(ii) means for interrogating the verification strip so as to read the information stored on or within said strip.

10 8. A system according to claim 7 wherein the said magnetically coded verification strip is embedded within a component of the merchandise packaging.

15 9. A system according to claim 7 wherein the said magnetically coded verification strip is located on the surface of the packaging component.

20 10. A system according to claim 9, wherein the magnetically coded verification strip is applied to the surface of the packaging component by means of hot-foil stamping.

25 11. A system according to claim 9, wherein the magnetically coded verification strip is applied to the surface of the packaging component by means of adhesion.

30 12. A system according to claim 9, wherein the magnetically coded verification strip is applied to the surface of the packaging component by means of lamination.

35 13. A system according to any one of claims 7 to 12, further comprising a means for generating an audible and/or visual confirmation of a valid readout.

-12-

14. A magnetically coded strip which provides means of verifying the authenticity of merchandise or of uniquely identifying a particular batch or pack of merchandise, characterised in that the strip comprises
5 a predetermined pattern of high permeability, low coercivity magnetic elements exhibiting zero or very low remanence, wherein said magnetically coded strip is incorporated in, or secured to, at least one component of merchandise packaging.
- 10 15. A magnetically coded strip according to claim 14 for use with cigarette packaging, wherein the high permeability, low coercivity magnetic material is embedded within the tear off strip which forms part of
15 the outer wrapping material.
16. A magnetically coded strip according to claim 14 for use with cigarette packaging, wherein the high permeability, low coercivity magnetic material is
20 coated onto the surface of the cigarette carton.
17. A magnetically coded strip according to claim 14, wherein the predetermined pattern of high permeability, low coercivity magnetic elements is repeated along the
25 total length of the tear-off strip.
18. A magnetically coded strip according to any one of claims 14 to 17, wherein the said strip comprises a read-only component and a programmable component.
- 30 19. A magnetically coded strip which provides means of verifying the authenticity of merchandise or of uniquely identifying a particular batch or pack of merchandise, characterised in that the strip comprises
35 a layer of a first high permeability, low coercivity magnetic material, and a layer of a second magnetic

-13-

material carrying, or capable of carrying, a recorded magnetic pattern, wherein said magnetically coded strip is incorporated in, or secured to, at least one component of merchandise packaging.

5

20. A method of verifying the authenticity of merchandise or of uniquely identifying a particular batch or pack of merchandise, which comprises incorporating in, or securing to, at least one component of the packaging in which the merchandise is packaged for distribution and/or sale, a magnetically coded strip comprising a layer of a first high permeability, low coercivity magnetic material, and a layer of a second magnetic material carrying, or capable of carrying, a recorded magnetic pattern.

10

15

20

25

30

35

1/1

Fig.1.

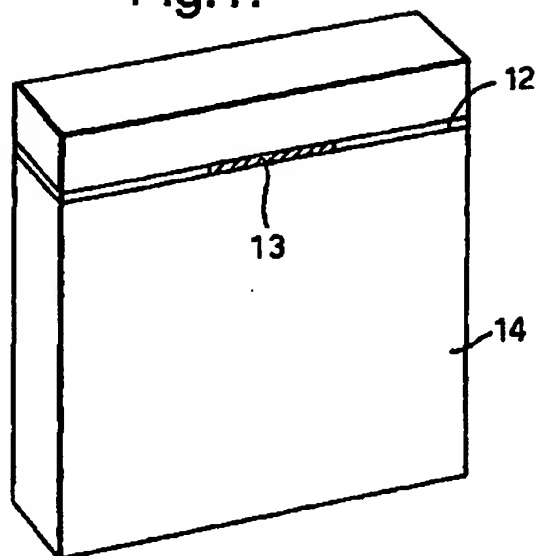


Fig.2.

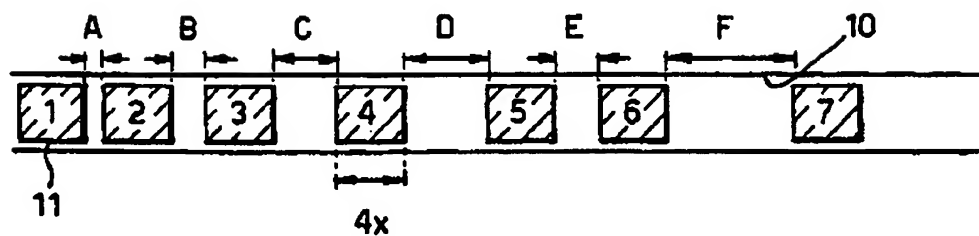
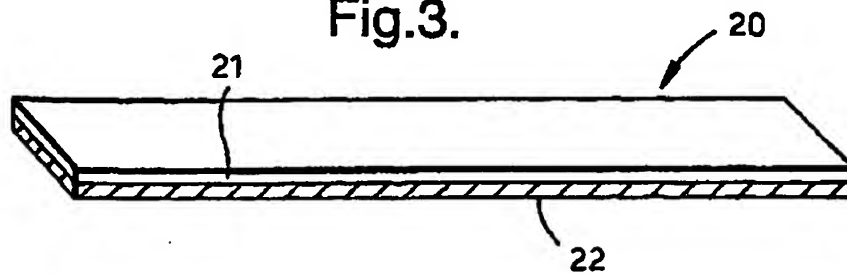


Fig.3.



RECTIFIED SHEET (RULE 91)
ISA/EP

INTERNATIONAL SEARCH REPORT

International Application No.

PCT/GB 99/02372

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 G08B13/24 B65D75/66 G01V15/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 G08B B65D G01V

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	EP 0 317 202 A (PHILIP MORRIS) 24 May 1989 (1989-05-24) cited in the application the whole document	1-20
Y	WO 96 31790 A (DAMES ANDREW NICHOLAS ;SCIENT GENERICS LTD (GB)) 10 October 1996 (1996-10-10) cited in the application page 32, line 35 -page 34, line 12; figure 9	1-20
A	WO 97 04338 A (SCIENT GENERICS LTD ;DAMES ANDREW NICHOLAS (GB); CROSSFIELD MICHAEL) 6 February 1997 (1997-02-06) cited in the application page 10, line 14 -page 14, line 16; figures 1-5	18-20
	-/-	

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents:

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the International filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the International filing date but later than the priority date claimed

- "T" later document published after the International filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- "X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- "Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
- "&" document member of the same patent family

Date of the actual completion of the international search

28 October 1999

Date of mailing of the international search report

08/11/1999

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo rd,
Fax: (+31-70) 340-3016

Authorized officer

Sgura, S

INTERNATIONAL SEARCH REPORT

Int. Application No

PCT/GB 99/02372

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5 729 201 A (SCHROTT ALEJANDRO GABRIEL ET AL) 17 March 1998 (1998-03-17) abstract	1
A	GB 2 312 595 A (FLYING NULL LTD) 29 October 1997 (1997-10-29) abstract	1

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/GB 99/02372

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
EP 0317202	A	24-05-1989	US 4836378 A	06-06-1989
			DE 3879394 A	22-04-1993
			JP 1199866 A	11-08-1989
			JP 2909505 B	23-06-1999
WO 9631790	A	10-10-1996	AU 5280696 A	23-10-1996
			BR 9604784 A	07-07-1998
			CA 2217762 A	10-10-1996
			CN 1185210 A	17-06-1998
			CZ 9703141 A	14-01-1998
			EP 0834091 A	08-04-1998
			GB 2313745 A	03-12-1997
			GB 2322769 A	02-09-1998
			GB 2322770 A, B	02-09-1998
			GB 2322048 A	12-08-1998
			GB 2322049 A	12-08-1998
			HU 9802671 A	29-03-1999
			JP 11504447 T	20-04-1999
			NO 974587 A	04-12-1997
			NZ 304922 A	29-09-1999
			PL 322617 A	02-02-1998
WO 9704338	A	06-02-1997	AU 4725096 A	18-02-1997
			CA 2227170 A	06-02-1997
			CN 1193388 A	16-09-1998
			EP 0839330 A	06-05-1998
			JP 11509323 T	17-08-1999
US 5729201	A	17-03-1998	US 5831532 A	03-11-1998
GB 2312595	A	29-10-1997	NONE	

**This Page is Inserted by IFW Indexing and Scanning
Operations and is not part of the Official Record**

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- ☐ BLACK BORDERS
- ☐ IMAGE CUT OFF AT TOP, BOTTOM OR SIDES
- ☐ FADED TEXT OR DRAWING
- ☐ BLURRED OR ILLEGIBLE TEXT OR DRAWING
- ☐ SKEWED/SLANTED IMAGES
- ☐ COLOR OR BLACK AND WHITE PHOTOGRAPHS
- ☐ GRAY SCALE DOCUMENTS
- ☒ LINES OR MARKS ON ORIGINAL DOCUMENT
- ☐ REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY
- ☐ OTHER: _____

IMAGES ARE BEST AVAILABLE COPY.

As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.